

Why Studio Biology?

"Active learning should be the central dogma of science education" ~Freeman *et al*, 2014

GOALS:

PEDAGOGY: Convert a large lecture course into an active learning classroom experience that resonates with engineering students and engages them fully with the course material.

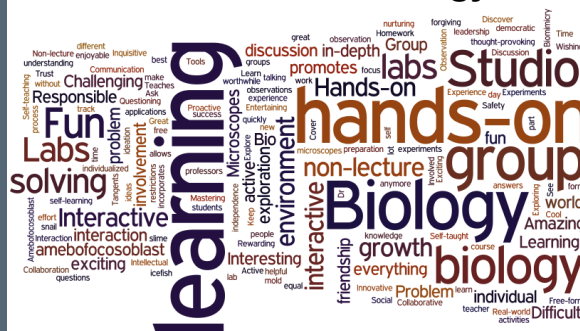
CURRICULUM DESIGN: Use tenets of scientific teaching and backward course design to:

- 1 Develop a streamlined curriculum rooted in biology's big ideas
- 2 Incorporate measurable learning outcomes
- 3 Encourage development of higher order thinking skills

CLASSROOM DESIGN: Transform a traditional lab space into an innovative studio lab environment that will:

- 1 Maximize student dialogue within small groups
- 2 Allow whole class instruction enhanced by annotated computer images or videos
- 3 Meet the needs of a traditional biology wet lab

What is Studio Biology?



Course Structure

- 1 Textbook reading assignment supported by online HW with adaptive learning
- 2 Quick Check with Just-In-Time Teaching
- 3 Individual Learning Readiness Quiz: Clickers + Peer Instruction
- 4 Group Challenge Problem
- 5 Exploration with Follow-Up
- 6 Lab with Lab Report

Contact time: 6 hours per week
2 hours, 3 times per week
OR
3 hours, 2 times per week

- 21 groups of 3 students
- Groups self-assemble
- New groups after each exam
- New group leader each week

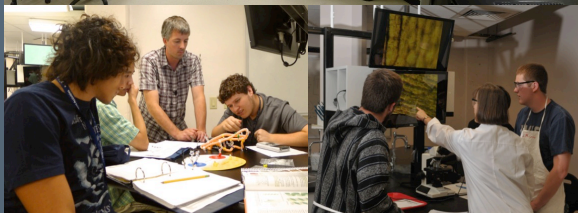
Engaging Labs Support Learning

- Explore basic concepts of biology
- Experimental design: Guided inquiry followed by open inquiry
- Data collection & analysis supported and enriched by technology



Studio Biology Classroom Design

Floor Plan and Bench Design Maximize Dialogue
Technology Enriches Student Labs



2300 Square feet

Whole Class Instruction in a Wet Lab



Instructor podium sends a signal to all 21 workstations



Cantilevered work stations facilitate student interactions

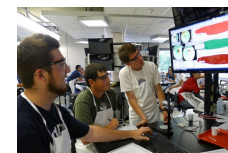


Each workstation has a sink and storage

Pedagogy in a Studio Classroom: Active Learning

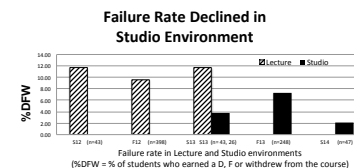
Deliberate Practice: The one *doing* is the one *learning*.

- Emphasize
 - Process over content
 - Concepts over details
- Just-in-time teaching
 - Mini-lectures as needed, ≤ 30 minutes
- Active learning
 - Cooperative group learning
 - Instructors and TA's model, coach, fade
 - Large whiteboards/interactive TV monitors
- Metacognition
 - "What did I learn? How did I learn it?"

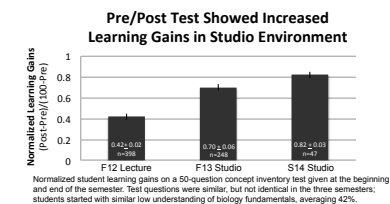


Is Studio Biology Effective?

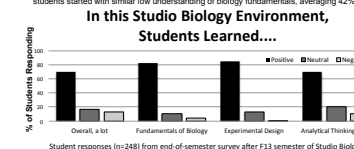
1 Increased Student Success



2 Increased Learning Gains



3 Positive Student Attitudes



Acknowledgements

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